SVKM's
D. J. Sanghvi College of Engineering

Program: B.Tech in Electronics Engineering **Academic Year: 2022** **Duration: 3 hours**
Date: 12.01.2023
Time: 10:30 am to 01:30 pm
Subject: Data Structures and Algorithms (Semester V) **Marks: 75**

Academic Year (2022-23)
Year: 3 Semester: V
Program: B. Tech. (Electronics Engineering) **Max. Marks: 75**
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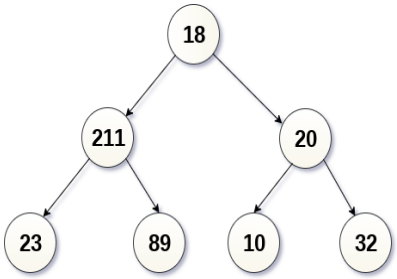
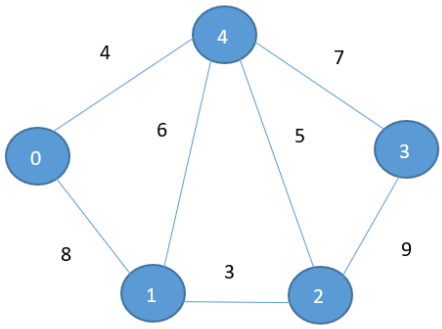
REGULAR EXAMINATION

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.
(1) This question paper contains 2 pages.
(2) All Questions are Compulsory.
(3) All questions carry equal marks.
(4) Answer to each new question is to be started on a fresh page.
(5) Figures in the brackets on the right indicate full marks.
(6) Assume suitable data wherever required, but justify it.
(7) Draw the neat labelled diagrams, wherever necessary.

Q No.		Max. Marks

Q1 (a)	Define the term "Algorithm". What are essential characteristics of an algorithm?
	OR
	Consider the following recursive function that takes two arguments.
	Int foo(int n,int r)
	{
	If (n > 0)
	return ((n%r) + foo(n/r, r);
	Else
	return 0;
	}
	Calculate time complexity required for this algorithm.
		[05]
		
		[05]

Q1 (b)	Write an algorithm for merge sort and comment on its complexity.	[10]
Q2 (a)	algorithm to insert a node in the linked list 1)at the end 2) at the given index **OR** Write an algorithm to convert Infix expression to Postfix expression. Use the same algorithm to convert A * (B + C) * D to postfix.	[10] [10]
Q2 (b)	Compare and Contrast between Linear and Non-linear Data Structures.	[05]

Q3 (a)	Write a program for implementing queue using array. **OR** Traverse the following binary tree using in-order, pre-order and post-order traversal by giving its algorithm.  	[10] [10]
Q3 (b)	Explain ADT for Stack. Explain various operations on Stack.	[05]
Q4 (a)	What is depth, height, level, path and degree of the binary tree. **OR** Construct Binary search tree for following elements. 45, 39, 56, 12, 34, 78, 32, 10, 89, 54, 67, 81	[05] [05]
Q4 (b)	Consider the following sorted array with 13 elements: 11, 22, 30, 33, 40, 44, 55, 60, 66, 77, 80, 88, 99 Write Binary Search algorithm. Illustrate the working of binary search technique while searching an element (i) 40 (ii) 85	[10]
Q5 (a)	What is Priority queue? Write various applications of Priority queue. **OR** What are the different ways to represent a graph?	[05] [05]
Q5 (b)	Draw the MST using Kruskal's and Prim's algorithm and find out the cost with all intermediate steps.  	[10]

All the Best!